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Interim Data Analysis Results for Release B

Technical Paper

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RESPONSIBLE ENGINEER

G. Bland /s/ for	12/15/95
Janet Hylton, Consulting Engineer	Date
EOSDIS Core System Project	

SUBMITTED BY

Mary S. Armstrong /s/	12/15/95
Mary Armstrong, Multi-Release Support Manager	Date
EOSDIS Core System Project	

Hughes Information Technology Corporation
Upper Marlboro, Maryland

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Abstract

This paper provides an overview of the Release B Data Analysis approach in addition to a preliminary assessment of the results of the Release B Product analysis. The intent is to provide insight into the Release B Data Analysis Process specifically addressing the distinctions between Release A and Release B in addition to a snapshot of Release B Data Analysis tasks.

Keywords: data model, model, data, Release B, product analysis, views

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Abbreviations and Acronyms

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1. Introduction

1.1 Purpose

The purpose of this paper is to present the Release B data analysis process in addition to providing a draft of the preliminary results from the Release B product analysis.

1.2 Organization

This paper is organized as follows:

Section 2 contains a brief description of the Release B Data Engineering process that is currently being used within the Data Engineering Organization.

Appendix A contains the interim product analysis results table for Release B.

1.3 Review and Approval

This paper is an informal document approved at the Office Manager level. It does not require formal Government review or approval; however, it is submitted with the intent that review and comments will be forthcoming.

The concepts presented in this paper are expected to migrate into the following formal CDRL deliveries:

Table 1-1. Paper to CDRL Migration

Paper Section	CDRL DID/Document Number
2	DID 311 Release B CDR
2.1	DID 205

Questions regarding technical information contained within this paper should be addressed to the following ECS and/or GSFC contacts:

- ECS Contacts
 - Janet F. Hylton, 301-925-0466, janet@eos.hitc.com
 - Graham Bland, 301-925-0433, grahamb@eos.hitc.com

Questions concerning distribution or control of this document should be addressed to:

Data Management Office
The ECS Project Office
Hughes Information Technology Corporation
1616 McCormick Drive
Upper Marlboro, MD 20774

2. Release B Data Analysis Activities

This section will address the differences that will occur in the execution of the Data Engineering Process between Release A and Release B data analysis. The Data Engineering Process as defined in the Release A DID 311, and illustrated below, with Release B modifications, will be followed for Release B. The fundamental difference will reside in the source and content of the information which is collected, analyzed and integrated into the existing data model. Additionally, for Release B a subset of Release B products will be analyzed rather than all release B products which was the case during Release A product analysis. Further for Release B direct(visits)/indirect(telecons) will be made with the instrument teams and DAACS for the purpose of clarifying the model and it's usage. Another significant difference between the Release A and Release B data analysis effort is that the existing Release A prescriptive model will be used as a baseline model for the Release B data model to which the results of Release B analysis will be applied. As a result the Release B model will differ from the Release A model.

In order to successfully execute the process illustrated below two major tasks will be conducted by the Data Engineering Organization:

- View Collection, Analysis and Integration and;
- Product Analysis.

The View Collection Analysis and Integration will provide the Earth Science User Views that the model must accommodate, the product analysis will reveal the unique characteristics of the Release B data which must be applied. The following briefly describes each of these tasks.

2.1 View Collection, Analysis and Integration

The view collection, analysis and application of the views activity is similar to the task performed for Release A. That is, the User Access, Results, Update, and System Archive Views, for Release B will be collected and further analyzed to determine their impact on the Earth Science Model and to define the Release B Archive Views or specifications. The impact on the data model may include identifying additional attributes, tightening up existing definitions, or identifying additional relationships. As specified in the Release B SDPS Release and Development Plan for the ECS Project the following represents an example of the additionally functionality which will be supported in Release B.(Release B Science Data Processing Segment Release and Development Plan for the ECS Project, dated October 1995, 307-CD-004-001;329-CD-004-001).

- Two way Interoperability with NOAA; added interoperability with CIESIN/SEDAC; Increased access capability to GCMD and GCDIS.
- More robust multi-DAAC planning and scheduling, including support for inter-DAAC resource conflict resolution via access to common planning data; support to Targets of Opportunity.
- Greatly increased data processing and required data product storage, especially for AM-1 mission support.

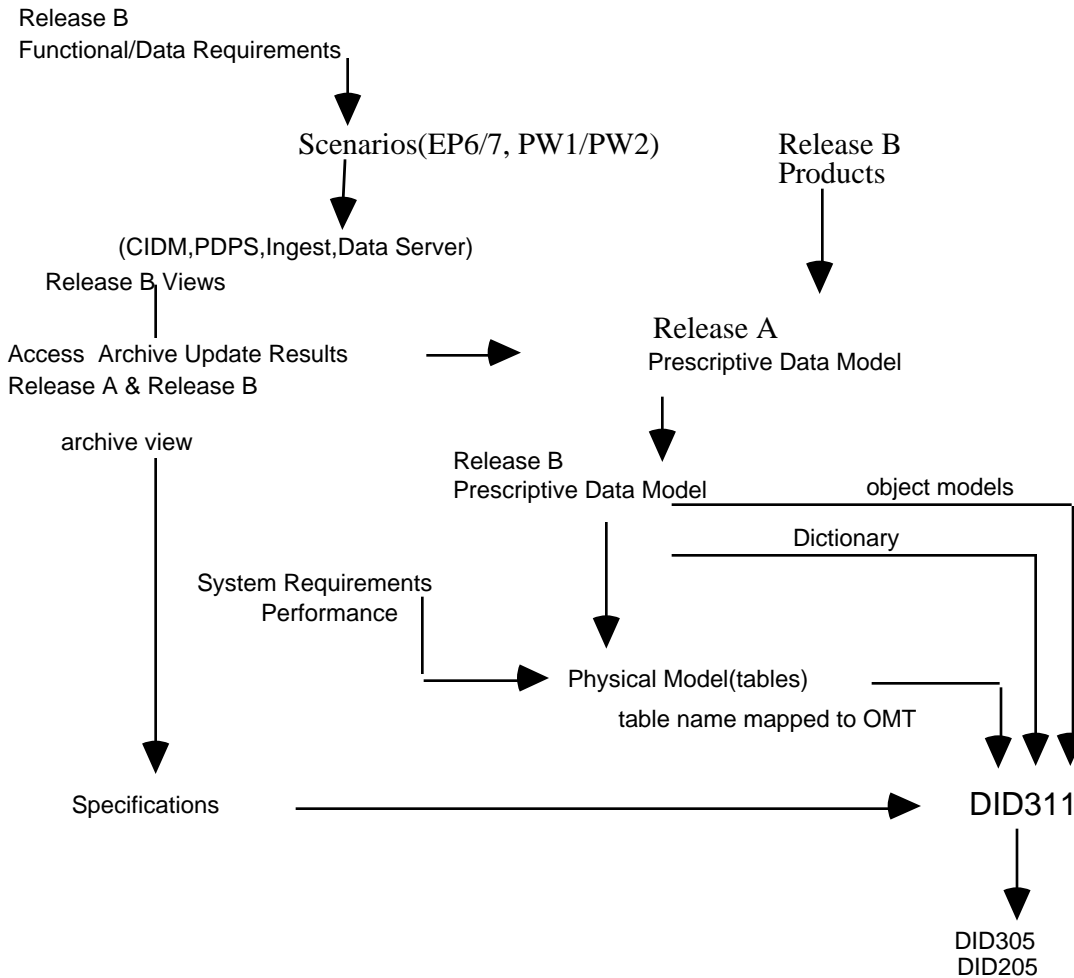


Figure 2-1. Data Engineering Process

- Replacement of V0 client capability with Version 1 ECS client.
- Increased capability to translate data to HDF and other standard formats.
- Automated data accounting and handling of Data Availability Notices from EDOS and from the ASTER GDS.
- Enhanced Local Information Manager capabilities and implementation of Distributed Information Manager (DIM) capabilities.
- More complex data searches, including multiple dataset coincident search capability. Enhanced processing on demand versus simple storage and retrieval from archive.
- Robotic control of file servers; enhanced attached storage capability; API's for scientists to gain access to data storage and retrieval services. Enhanced metadata capabilities - expandable metadata attributes and geographic metadata search, including World Reference System parameter.

These functions will serve to initially guide the view collection/analysis and integration activities for Release B. The following presents a description of the two major analysis activities which will occur to support the impact analysis.

2.1.1 View Collection/Analysis

For Release B the source of information that will be reviewed to identify user views will differ somewhat from the Release A approach. For Release A the V0 Client requirements were the primary source for Earth Science user access and results view collection and analysis. For Release B the following list of potential sources will be used to identify the views.

- The Release B Formal track design components
 - Ingest
 - PDPS
- The Release B Incremental Track design components
 - Client
 - Interoperability
 - Data Management
- The results of EP Development, Implementation and Reviews.
- The results from the Design Issue Team will provide input to the view collection activity.
- The Release B Scenarios will provide real world examples of what the earth science data model must be capable of responding to in an operational setting. The analysis of these scenarios will provide a collection of data which will be required to support the functionality of the scenario.
- Interface Control Documents for Release B. The DE Team will work closely with the Interface Control team to insure that the interfaces can be supported within the data model.

As with release A the application support data coupled with the system management data if appropriate will be specified for each view. Although it is unlikely that we will discover Earth Science User views in the Ingest and PDPS design components, for the sake of completeness, we will review these subsystems designs.

2.1.2 View Integration

This step is similar to the Release A view application activity in which the content of the view is mapped to the earth science model to determine if additional data, relationships, objects or cardinality may be required to support the view. For Release B we will need to integrate the release B views with the Release A views, resolving any discrepancies, then apply the results to the data model. For example, the release A Document Authoring capability is being supported by local DAAC Authoring Tools and the results ingested into ECS. For Release B the Document Authoring functionality will be incorporated within the ECS System. Therefore the Release A

Guide archive view will need to be synchronized with the Release B Guide Population View to ensure that the components of the archive view are being addressed in the population view.

2.2 Product Analysis

The Release A product analysis provided the basis for the Release A descriptive model. The Release B product analysis will serve a slightly different purpose. Therefore, the process for collection and analysis is also slightly different. The focus of this analysis is to verify the stability of the earth science model by ensuring that the Release B data can be accommodated within the data model. The product analysis phase of this effort for Release B Products will involve the following: .

- Identify Release B Products from the Technical Baseline.
- Map a subset of the Release B Products to the Earth Science Data Model
- Collaborate with the Release B DAACS for the purpose of clarifying the data model and providing support in the application of the model to the DAAC specific data.

Product specific metadata is defined as the data which is required to describe the characteristics(attributes) of the data collection and each individual data granule. For the collection this would include the collection level earth science (core) attributes which relate to the collection in addition to any specific collection level characteristics which may be required to adequately describe the collection. For the granule, this would include the ECS Data Granule core attributes as specified in the data model in addition to any granule specific characteristics about the granule that needs to be recorded in the ECS Metadata.

The following describes the individual tasks that will be conducted during the product analysis phase.

1. Test Data Model with Release B Data

The core model requires further testing in order to ensure that the attributes reasonably represent the required metadata across both A and B Releases. The selection of products should be based on server groupings; i.e. products having similar scientific content and being processed in the same location should be associated together. Such groupings have already been developed for release A and a similar grouping should be made for release B products. Once made, a single representative product from three contrasting servers should be selected. The products selected should be those which are known to have a large amount of readily definable metadata. The selected products, should be analyzed with instrument team input and mapped against the core set. This will develop and test the applicability of the core model. The following identifies some common areas where information could surface during product analysis which would require a change to the information contained in the data model.

- Identification of Aliases
- Clarification of existing attribute definitions
- Adjustment of associations or relationships

The metadata which cannot be mapped to the data model is ignored in this exercise except to log the specific information as was done for the release A product specific data in Table C-2 of DID311.

Some preliminary analysis efforts have occurred over the past several months. Instrument teams have been visited by an ECS representative for the purpose of identify product specific characteristics and describing the functionality of the tool kit. The primary focus of these trips was to explain the granule metadata creation process which is supported through the tool kit development effort. However, much collection/granule level information was provided and recorded during these visits. This information will be used, in addition to the selected products, during the above task to assist in verifying the data model. A subset of the data collection results of these visits are being presented in Appendix A of this Technical Paper.

2. Application of the Data Model

Having further developed the model for release B data, it will be necessary to communicate the results and the procedures for achieving these results to the instrument teams. This is necessary for the following two reasons.

First, is the need to ensure the correct use of the model by assisting instrument teams and other responsible individuals in the procedures for mapping their data to the core data represented in the model. Mapping is an essential pre-requisite to population. The population procedure for collection level is quite different than for granule level metadata and this impacts the preparatory mapping stage. In the former case, the population of the collection metadata is a human/manual process consisting of understanding the core set and creating the appropriate values from available documentation and other sources. Additional non-core attributes may also be entered at this stage. In the latter case, software must be written to supply metadata attribute values. Thus the core set for granules (see appendix B of DID311) must be understood and the appropriate software developed to routinely supply the values from PGE runs.

The second reason is to ensure a continuing feedback from this mapping to the ECS modeling team who are capturing and recording new alias terms which are applied to the core attribute set. This information will enable the central data dictionary to provide project wide terminology to all components of the ECS System.

The following activities are recommended in support of this task.

1. Visit or conduct a telecon with each instrument team. This communication should be undertaken by knowledgeable ECS staff. One set of such visits has already occurred where metadata were gathered and a preliminary mapping has occurred. A second visit/telecon will provide the basis for full mapping of both collection and granule metadata.
2. Visit or conduct a telecon with each DAAC. This is necessary to inform DAACs of the outcome of instrument team mapping which will enable the DAAC staff to begin to understand the underlying semantics of how the databases will be populated. Specifically the attributes and the relationships between the attributes will be the primary focus of this exchange of information during this communication.

2.3 Results

Collectively the process of view collection, analysis and integration, coupled with the product specific analysis will serve to describe the Release B Data Model. Further this data model will be synchronized with the Release B functionality. The final documented results will appear in the Release B CDR DID311. This document will share a similar format/structure as the Release A DID311. Data will be mapped to the subsystem design specifications. Physical database schemas will be provided. Views will also be provided as will additional Release B specifications if appropriate.

Appendix A. Release B Product Specific Tables

A.1 Introduction

Tables A-1, A-2a and A-2b contain product specific metadata mapped to the core ECS metadata. The product specific metadata are grouped against servers previously established (see DID 311, 12/95). This means that groups of products similar in science terms are grouped and assumed to require similar product specific attributes.

There are three stages to this product specific work:

1. attributes derived from early release A product analysis and used in core model development
2. attributes derived from later release A product analysis to validate the model, provide server specific domains and alias information and define server specific search attributes
3. attributes derived from release B work to further validate the model, provide server specific domains and alias information and define server specific search attributes

This appendix represents the outcome preliminary work in the third of these areas. The first two stages are found in appendix C of DID311 (12/95).

The product specific attributes are mapped in two distinct senses. First where metadata were analyzed for purposes of constructing the core metadata set and therefore map directly to core attributes (but often with different names), and secondly attributes which were judged sufficiently specific to warrant designation as non-core attributes

A.1.1 Mapping to Core Attributes (A-1)

The work done with Release A and Version 0 product in constructing the model is reflected through the mapping of certain domains and aliases to the core attributes. Table A-1 shows these. Where a domain exists, this indicates that server utilizes this attribute. It also indicates that the attribute is server specific in respect of the domain which then overrides the core domain range (if one exists). This does not however imply that the server (and the products within the server) do not use other core attributes (this is determined by the mandatory set - see Appendix B of DID 311 of 12/95). The mapping of these values enables implementers to build suitable server specific constraints into the implemented tables.

A.1.2 Non Core Attributes (A-2)

Attributes derived from the analysis of these same products which did not warrant the addition of a core attribute are contained in the parameter class of the data model. This is a self describing class used to capture attributes and attribute values of several types. Parameter class can be used for:

- capturing the names, descriptions and data types of attributes which are to be used in addition to core attributes to search for the collection or instances of the granule. There are two caveats:
 - a. Where the attribute has a value covering the entire collection, the value is included at some point with this collection metadata. Where the attribute applies to each granule (e.g. average sea surface temperature of each granule) then the value is supplied with other granule values.
 - b. If the attribute is physical or geophysical, then this is described in the PhysicalParameterDetails Class.
- capturing the names, descriptions and data types of the content of the collection (i.e. generic granule content). This provides a data product description in metadata attribute form. Caveat 'a' above does not apply while caveat 'b' does.

Tables A-2 (a and b) contains attributes of the first type explained above (additional search capability) only. Additional to the attribute set (parameter name, data type, etc.) is a statement of the server to which the attribute set belongs. Also included is a statement of whether the attribute value is being supplied with each granule or at the collection level. This enables the implementers to build suitable table structures on a server by server basis as is appropriate.

A.2 Mapping of Server Specific Domains and Aliases to the Core Model (A-1)

Table A-1. Mapping of Server Specific Domains & Aliases (1 of 2)

ATTRIBUTE	MODULE	CLASS	GSFC MODIS L1	GSFC MODIS L1
			domain	alias
BrowsePointer	Collections_IDR	Browse		Browse Package Reference
ContactOrganizationName	Collections_IDR	ContactOrganization		Point of Contact
EastBoundingCoordinate	LocalitySpatial_IDR	BoundingBox		Easternmost_latitude
FutureReviewDate	Collections_V1	Review		Future Review Date
InstrumentName	DataOriginator_IDR	Instrument		Satellite Short name
LocalityType	LocalitySpatial_IDR	Locality		Locality Type
NorthBoundingCoordinate	LocalitySpatial_IDR	BoundingBox		Northernmost_latitude
ProductionHistoryPointer	Collections_IDR	ProductionHistory		Input Data Files
ProcessingLevelID	Collections_IDR	ProcessingLevel		Processing Level ID
ProcessControlParameterandResourceFilesPointer	DeliveredAlgorithmPackage_IDR	ProcessControlParameterandResourceFiles		Processing Control Inputs
ProcessControlParameterandResourceFilesPointer	DeliveredAlgorithmPackage_IDR	ProcessControlParameterandResourceFiles		Processing Log Outputs

Table A-1. Mapping of Server Specific Domains & Aliases (2 of 2)

ATTRIBUTE	MODULE	CLASS	GSFC MODIS L1	GSFC MODIS L1
PlatformShortName	DataOriginator_IDR	Platform		Satellite short name
ReprocessingActual	Collections_IDR	ECSDDataGranule		Reprocessing Status
ReprocessingPlanned	Collections_IDR	ECSDDataGranule		Reprocessing Status
ScienceReviewStatus	Collections_V1	Review		Science Review Status
ScienceReviewDate	Collections_V1	Review		Science Review Date
ScienceQualityFlag	Collections_IDR	QACollectionStats		Quality Rating
SizeMBECSDDataGranule	Collections_V1	ECSDDataGranule	Mb	Product Size
SpatialCoverageType	LocalitySpatial_IDR	Spatial		Spatial Coverage Type
SpatialKeyword	Collections_V1	SpatialKeywordClass		Spatial Keyword
SouthBoundingCoordinate	LocalitySpatial_IDR	BoundingRectangle		Southernmost_latitude
TemporalKeyword	Collections_V1	SingleTypeCollection		Temporal Keyword
TemporalRangeType	LocalityTemporal_IDR	Temporal		Continuous_Range
WestBoundingCoordinate	LocalitySpatial_IDR	BoundingRectangle		Westernmost_latitude

A.3 Non-core Attributes (A-2a and A-2b)

The column headings in this table are derived from the two earth science model classes, Parameter and PhysicalParameterDetails. They represent the non-core or product specific attributes whose derivation is described in section A.1.2 above. The current set of attributes information includes covers all known ASTER attributes plus some MODIS (as designated by product name). The remaining columns must be populated to enable implementation. Table A-2a is sorted by server while Table A-2b contains the same information but is sorted by attribute.

The two rightmost columns contain additional information as follows:

Server

This is the name of the server in which these non-core attributes are required. The servers are the same as those found in Table A-1.

Granule / Collection

The column indicates the association of the attribute; i.e., the metadata class to which the attribute value should be linked in implementation. It can also be viewed as a 'rate of change' statement indicating that the attribute value updates either with each granule or is static and applicable only once to the whole collection. The vast majority of the non-core attributes are of the former type; i.e., each granule has a specific attribute value.

The product name and Product ID indicate the exact product to which the attribute belongs.

Table A-2a. Non-core Attributes Sorted by Server (1 of 5)

Parameter Name	Parameter Description	Parameter Data Type	Server / Class	Granule / Collection	Product Name	Product ID
BAD_PIXEL_SWIR	Number of pixels rejected because SWIR dropout/saturation	char	EDC, ASTER, Auxiliary Data	GRANULE	Polar classification	AST13
BAD_PIXEL_TIR	Number of pixels rejected because TIR dropout/saturation	char	EDC, ASTER, Auxiliary Data	GRANULE	Polar classification	AST13
BAD_PIXEL_VNIR	Number of pixels rejected because VNIR dropout/saturation	char	EDC, ASTER, Auxiliary Data	GRANULE	Polar classification	AST13
LAND_PIXELS	Num. pixels classified as land	char	EDC, ASTER, Auxiliary Data	GRANULE	Polar classification	AST13
SHADOW_PIXELS	Num. pixels classified as shadow	char	EDC, ASTER, Auxiliary Data	GRANULE	Polar classification	AST13
SNOW/ICE_PIXELS	Num. pixels classified as snow/ice	char	EDC, ASTER, Auxiliary Data	GRANULE	Polar classification	AST13
THICK_CLOUD_PIXELS	Num. pixels classified as thick cloud	char	EDC, ASTER, Auxiliary Data	GRANULE	Polar classification	AST13
THIN_CLOUD_PIXELS	Num. pixels classified as thin cloud	char	EDC, ASTER, Auxiliary Data	GRANULE	Polar classification	AST13
UNKNOWN_PIXELS	Num. pixels classified as unknown	char	EDC, ASTER, Auxiliary Data	GRANULE	Polar classification	AST13
WATER_PIXELS	Num. pixels classified as water	char	EDC, ASTER, Auxiliary Data	GRANULE	Polar classification	AST13
Cloud information	At a minimum, total cloud coverage for the scene, and also the cloud coverage for each of the (16--TBR) blocks within the scene.	char	EDC, ASTER, Land Products	GRANULE	Registered radiance at sensor	AST03
CLOUD_PIXELS	number of cloud pixels	char	EDC, ASTER, Land Products	GRANULE	Brightness temperature	AST04
PIXELS_SET_MAX	number of pixels which produced a super-max value on lookup, max reported	char	EDC, ASTER, Land Products	GRANULE	Brightness temperature	AST04
PIXELS_SET_MIN	number of pixels which produced a sub-min value on lookup, min reported	char	EDC, ASTER, Land Products	GRANULE	Brightness temperature	AST04
SCENE_CLASSIFICATION	Identification of scene classification used.	char	EDC, ASTER, Land Products	GRANULE	Surface emissivity	AST05 & AST08
CLOUD_PIXELS	Number of cloud pixels processed in stretching image	char	EDC, ASTER, Land Products	GRANULE	Decorrelation stretch--VNIR	AST06

Table A-2a. Non-core Attributes Sorted by Server (2 of 5)

Parameter Name	Parameter Description	Parameter Data Type	Server / Class	Granule / Collection	Product Name	Product ID
CLOUD_STAT_PIXELS	Number of pixels rejected in gathering stats	char	EDC, ASTER, Land Products	GRANULE	Decorrelation stretch--VNIR	AST06
GOOD_PIXELS	Number of good pixels processed in stretching image	char	EDC, ASTER, Land Products	GRANULE	Decorrelation stretch--TIR	AST06
RTI_STAT_PIXEL_FREQUENCY	'Skip' factor in sampling for statistics	char	EDC, ASTER, Land Products	GRANULE	Decorrelation stretch--VNIR	AST06
SCENE_CLASSIFICATION_ID	ID of scene classification dataset used	char	EDC, ASTER, Land Products	GRANULE	Decorrelation stretch--VNIR	AST06
AEROSOL_OD_MEAN	mean for entire scene: aerosol optical depth	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07
AEROSOL_SA_MEAN	mean for entire scene: aerosol single scatter albedo	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07
AEROSOL_SA_SRC	source used for this product: aerosol single scatter albedo	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07
DEM_MAX_SLOPE	maximum slope in scene	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07
DEM_MIN_SLOPE	minimum slope (for entire scene)	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07
MASK_USED	whether or not mask was used	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07
MODTRAN_H2O_SRC	source used for this product: columnar water vapor profile	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07
MODTRAN_O3_RES	x-y resolution of source: ozone profile	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07
MODTRAN_O3_SRC	source used for this product: ozone profile	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07
MODTRAN_PRESS_RES	x-y resolution of source: pressure profile	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07
MODTRAN_PRESS_SRC	source used for this product: pressure profile	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07

Table A-2a. Non-core Attributes Sorted by Server (3 of 5)

Parameter Name	Parameter Description	Parameter Data Type	Server / Class	Granule / Collection	Product Name	Product ID
MODTRAN_TEMP_SRC	source used for this product: temperature profile	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07
MOLECULAR_OD_SRC	source used for this product: molecular optical depth	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07
AEROSOL_OD_MEAN	mean for entire scene: aerosol optical depth	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--VNIR, SWIR	AST09
AEROSOL_OD_SRC	source used for this product: aerosol optical depth	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--VNIR, SWIR	AST09
AEROSOL_SA_MEAN	mean for entire scene: aerosol single scatter albedo	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--VNIR, SWIR	AST09
AEROSOL_SA_SRC	source used for this product: aerosol single scatter albedo	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--VNIR, SWIR	AST09
DEM_MAX_SLOPE	maximum slope in scene	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--TIR	AST09
DEM_MIN_ELEVATION	minimum elevation (for entire scene)	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--TIR	AST09
DEM_MIN_SLOPE	minimum slope (for entire scene)	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--TIR	AST09
DEM_SRC	source of dem	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--TIR	AST09
MODTRAN_H2O_SRC	source used for this product: columnar water vapor profile	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--VNIR, SWIR	AST09
MODTRAN_H2O_SRC	source used for this product: columnar water vapor profile	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--TIR	AST09
MODTRAN_O3_SRC	source used for this product: ozone profile	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--VNIR, SWIR	AST09
MODTRAN_O3_SRC	source used for this product: ozone profile	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--TIR	AST09
MODTRAN_PRESS_SRC	source used for this product: pressure profile	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--VNIR, SWIR	AST09
MODTRAN_TEMP_SRC	source used for this product: temperature profile	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--VNIR, SWIR	AST09
MOLECULAR_OD_MEAN	mean for entire scene: molecular optical depth	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--VNIR, SWIR	AST09

Table A-2a. Non-core Attributes Sorted by Server (4 of 5)

Parameter Name	Parameter Description	Parameter Data Type	Server / Class	Granule / Collection	Product Name	Product ID
MOLECULAR_OD_SRC	source used for this product: molecular optical depth	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--VNIR, SWIR	AST09
First Scan End Latitude (granule corner)		Float	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
First Scan End Longitude (granule corner)		Float	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
First Scan Start Latitude (granule corner)		Float	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
First Scan Start Longitude (granule corner)		Float	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
Granule Number within Orbit		Integer	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
Last Scan End Latitude (granule corner)		Float	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
Last Scan End Longitude (granule corner)		Float	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
Last Scan Start Latitude (granule corner)		Float	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
Last Scan Start Longitude (granule corner)		Float	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
Max BB Frames (per scan)		Integer	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
Max Earth Frames (per scan)		Integer	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01

Table A-2a. Non-core Attributes Sorted by Server (5 of 5)

Parameter Name	Parameter Description	Parameter DataType	Server / Class	Granule / Collection	Product Name	Product ID
Max SD Frames (per scan)		Integer	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
Max SRCA Frames (per scan)		Integer	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
Max SV Frames (per scan)		Integer	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
Max Total Frames (per scan)		Integer	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
Number of Day mode scans (in Granule)		Integer	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
Number of Night mode scans (in Granule)		Integer	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
Number of scans (in Granule)		Integer	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
Scan Types in product	Day, Night, Mixed, Other	Text (10)	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01

Table A-2b. Non-core Attributes Sorted by Attribute (1 of 6)

Parameter Name	Parameter Description	Parameter Data Type	Server / Class	Granule / Collection	Product Name	Product ID
AEROSOL_OD_MEAN	mean for entire scene: aerosol optical depth	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07
AEROSOL_OD_MEAN	mean for entire scene: aerosol optical depth	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--VNIR, SWIR	AST09
AEROSOL_OD_SRC	source used for this product: aerosol optical depth	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--VNIR, SWIR	AST09
AEROSOL_SS_A_MEAN	mean for entire scene: aerosol single scatter albedo	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07
AEROSOL_SS_A_MEAN	mean for entire scene: aerosol single scatter albedo	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--VNIR, SWIR	AST09
AEROSOL_SS_A_SRC	source used for this product: aerosol single scatter albedo	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07
AEROSOL_SS_A_SRC	source used for this product: aerosol single scatter albedo	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--VNIR, SWIR	AST09
BAD_PIXEL_SWIR	Number of pixels rejected because SWIR dropout/saturation	char	EDC, ASTER, Auxiliary Data	GRANULE	Polar classification	AST13
BAD_PIXEL_TIR	Number of pixels rejected because TIR dropout/saturation	char	EDC, ASTER, Auxiliary Data	GRANULE	Polar classification	AST13
BAD_PIXEL_VNIR	Number of pixels rejected because VNIR dropout/saturation	char	EDC, ASTER, Auxiliary Data	GRANULE	Polar classification	AST13
Cloud information	At a minimum, total cloud coverage for the scene, and also the cloud coverage for each of the (16--TBR) blocks within the scene.	char	EDC, ASTER, Land Products	GRANULE	Registered radiance at sensor	AST03
CLOUD_PIXELS	Number of cloud pixels processed in stretching image	char	EDC, ASTER, Land Products	GRANULE	Decorrelation stretch--VNIR	AST06
CLOUD_PIXELS	number of cloud pixels	char	EDC, ASTER, Land Products	GRANULE	Brightness temperature	AST04

Table A-2b. Non-core Attributes Sorted by Attribute (2 of 6)

Parameter Name	Parameter Description	Parameter Data Type	Server / Class	Granule / Collection	Product Name	Product ID
CLOUD_STAT_PIXELS	Number of pixels rejected in gathering stats	char	EDC, ASTER, Land Products	GRANULE	Decorrelation stretch--VNIR	AST06
DEM_MAX_SLOPE	maximum slope in scene	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07
DEM_MAX_SLOPE	maximum slope in scene	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--TIR	AST09
DEM_MIN_ELEVATION	minimum elevation (for entire scene)	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--TIR	AST09
DEM_MIN_SLOPE	minimum slope (for entire scene)	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07
DEM_MIN_SLOPE	minimum slope (for entire scene)	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--TIR	AST09
DEM_SRC	source of dem	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--TIR	AST09
First Scan End Latitude (granule corner)		Float	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
First Scan End Longitude (granule corner)		Float	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
First Scan Start Latitude (granule corner)		Float	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
First Scan Start Longitude (granule corner)		Float	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
GOOD_PIXELS	Number of good pixels processed in stretching image	char	EDC, ASTER, Land Products	GRANULE	Decorrelation stretch--TIR	AST06

Table A-2b. Non-core Attributes Sorted by Attribute (3 of 6)

Parameter Name	Parameter Description	Parameter Data Type	Server / Class	Granule / Collection	Product Name	Product ID
Granule Number within Orbit		Integer	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
LAND_PIXELS	Num. pixels classified as land	char	EDC, ASTER, Auxiliary Data	GRANULE	Polar classification	AST13
Last Scan End Latitude (granule corner)		Float	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
Last Scan End Longitude (granule corner)		Float	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
Last Scan Start Latitude (granule corner)		Float	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
Last Scan Start Longitude (granule corner)		Float	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
MASK_USED	whether or not mask was used	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07
Max BB Frames (per scan)		Integer	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
Max Earth Frames (per scan)		Integer	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
Max SD Frames (per scan)		Integer	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
Max SRCA Frames (per scan)		Integer	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
Max SV Frames (per scan)		Integer	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01

Table A-2b. Non-core Attributes Sorted by Attribute (4 of 6)

Parameter Name	Parameter Description	Parameter Data Type	Server / Class	Granule / Collection	Product Name	Product ID
Max Total Frames (per scan)		Integer	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
MODTRAN_H2O_SRC	source used for this product: columnar water vapor profile	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07
MODTRAN_H2O_SRC	source used for this product: columnar water vapor profile	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--VNIR, SWIR	AST09
MODTRAN_H2O_SRC	source used for this product: columnar water vapor profile	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--TIR	AST09
MODTRAN_O3_RES	x-y resolution of source: ozone profile	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07
MODTRAN_O3_SRC	source used for this product: ozone profile	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07
MODTRAN_O3_SRC	source used for this product: ozone profile	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--VNIR, SWIR	AST09
MODTRAN_O3_SRC	source used for this product: ozone profile	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--TIR	AST09
MODTRAN_PRESS_RES	x-y resolution of source: pressure profile	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07
MODTRAN_PRESS_SRC	source used for this product: pressure profile	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07
MODTRAN_PRESS_SRC	source used for this product: pressure profile	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--VNIR, SWIR	AST09
MODTRAN_TEMP_SRC	source used for this product: temperature profile	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07
MODTRAN_TEMP_SRC	source used for this product: temperature profile	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--VNIR, SWIR	AST09
MOLECULAR_OD_MEAN	mean for entire scene: molecular optical depth	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--VNIR, SWIR	AST09

Table A-2b. Non-core Attributes Sorted by Attribute (5 of 6)

Parameter Name	Parameter Description	Parameter Data Type	Server / Class	Granule / Collection	Product Name	Product ID
MOLECULAR_OD_SRC	source used for this product: molecular optical depth	char	EDC, ASTER, Land Products	GRANULE	Surface reflectance	AST07
MOLECULAR_OD_SRC	source used for this product: molecular optical depth	char	EDC, ASTER, Land Products	GRANULE	Surface radiance--VNIR, SWIR	AST09
Number of Day mode scans (in Granule)		Integer	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
Number of Night mode scans (in Granule)		Integer	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
Number of scans (in Granule)		Integer	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
PIXELS_SET_MAX	number of pixels which produced a super-max value on lookup, max reported	char	EDC, ASTER, Land Products	GRANULE	Brightness temperature	AST04
PIXELS_SET_MIN	number of pixels which produced a sub-min value on lookup, min reported	char	EDC, ASTER, Land Products	GRANULE	Brightness temperature	AST04
RTI_STAT_PIXEL_FREQUENCY	'Skip' factor in sampling for statistics	char	EDC, ASTER, Land Products	GRANULE	Decorrelation stretch--VNIR	AST06
Scan Types in product	Day, Night, Mixed, Other	Text (10)	GSFC, MODIS, L0/L1	granule	Modis Level 1A raw counts	MOD01
SCENE_CLASSIFICATION	Identification of scene classification used.	char	EDC, ASTER, Land Products	GRANULE	Surface emissivity	AST05 & AST08
SCENE_CLASSIFICATION_ID	ID of scene classification dataset used	char	EDC, ASTER, Land Products	GRANULE	Decorrelation stretch--VNIR	AST06
SHADOW_PIXELS	Num. pixels classified as shadow	char	EDC, ASTER, Auxiliary Data	GRANULE	Polar classification	AST13
SNOW/ICE_PIXELS	Num. pixels classified as snow/ice	char	EDC, ASTER, Auxiliary Data	GRANULE	Polar classification	AST13
THICK_CLOUD_PIXELS	Num. pixels classified as thick cloud	char	EDC, ASTER, Auxiliary Data	GRANULE	Polar classification	AST13

Table A-2b. Non-core Attributes Sorted by Attribute (6 of 6)

Parameter Name	Parameter Description	Parameter Data Type	Server / Class	Granule / Collection	Product Name	Product ID
THIN_CLOUD_PIXELS	Num. pixels classified as thin cloud	char	EDC, ASTER, Auxiliary Data	GRANULE	Polar classification	AST13
UNKNOWN_PIXELS	Num. pixels classified as unknown	char	EDC, ASTER, Auxiliary Data	GRANULE	Polar classification	AST13
WATER_PIXELS	Num. pixels classified as water	char	EDC, ASTER, Auxiliary Data	GRANULE	Polar classification	AST13

Abbreviations and Acronyms

AM-1	EOS AM Project spacecraft 1, morning spacecraft series -- ASTER, CERES, MISR, MODIS and MOPITT instruments
API	application program (or programming) interface
CD	contractual delivery 214-001
CDR	Critical Design Review
CDRL	Contract Data Requirements List
CIESIN	Consortium for International Earth Science Information Network
DAAC	Distributed Active Archive Center
DID	data item description
DIM	distributed information manager (SDPS)
DE	Data Engineering
ECS	EOSDIS Core System
EDOS	EOS Data and Operations System
EP	Early Prototype
GCMD	Global Change Master Directory
HDF	hierarchical data format
NOAA	National Oceanic and Atmospheric Administration
PDPS	Planning & Data Production System
PGE	Product Generation Executive